

has been felt. It is worthy of record that on two occasions, viz. in 1860 and 1865, the shocks were perceived on the south side of the fjord, the districts on the northern coast being wholly undisturbed.

THE last number of the *Transactions of the Seismological Society of Japan* (Yokohama, 1884) contains various papers on seismology. The first is by Prof. Milne, on earth pulsations; the next is by Mr. Alexander, on the interpretation of a diagram described by a particular form of earthquake instrument. The object of the writer is to calculate not only the maximum velocity, but also the maximum rate at which the velocity changes, "which is a measure of the effect which an earthquake exerts in overturning and fracturing bodies placed on the earth's surface." Prof. Ewing describes the construction of a pendulum which shall be without a tendency to swing when the point from which it is suspended suffers displacement. Mr. Gergens gives a note on ripple-like marks found on the surface of an iron casting supposed to have been shaken while solidifying, which marks are picturesquely described as "a note in a congealed earthquake." The remainder of the volume is occupied by suggestions for new types of seismographs, a list of earthquakes in Tokio, and a report on systematic earthquake observations.

A CORRESPONDENT in *Nature* has drawn attention to the great differences of climate observable last winter between Christiania and Stavanger. While in the former place there was a depth of from ten to twelve inches of ice during the month of January, vegetation had never been wholly arrested in the latter region at the same period. The grass plots in the various gardens at and near Stavanger were as green as in summer: daisies, snowdrops, pansies, violets, and primroses had their blossoms well set; peonies had appeared above the ground, and many roses had thrown out vigorous shoots. The thermometer fell only once in January to freezing point.

MM. MIGNON AND TOUARD, who established the refrigerating service at the Paris morgue, have made experiments with their system on hams infected by trichinæ, and are stated to have proved that these are rendered wholly innocuous by exposure during an hour to a cold of  $-20^{\circ}$  C. It will be proposed for the protection of consumers from trichinosis to render exposure obligatory in the case of importations from America or Germany.

THE great work of lighting the Paris Opera by incandescent light has already begun. The whole house will require 6000 lamps; at present 400 lamps are used.

THE additions to the Zoological Society's Gardens during the past week include a Pig-tailed Monkey (*Macacus nemestrinus* ♀) from Java, presented by Dr. Benthall; a Weeper Capuchin (*Cebus capucinus* ♀) from Brazil, presented by Miss Vincent; a Short-eared Owl (*Asio brachyotus*), British, presented by Mr. Oscar Burrows; a Smooth Snake (*Coronella levis*), a Common Viper (*Vipera berus*), a Common Snake (*Tropidonotus natrix*), a Slow-worm (*Anguis fragilis*) from Hampshire, presented by Mr. W. H. B. Pain; an Alligator (*Alligator mississippiensis*) from the Mississippi; a Horrid Rattlesnake (*Crotalus horridus*) from Florida, presented by Mr. A. Begg; a Philantomba Antelope (*Cephalophus maxwelli*) from South Africa, deposited; a Moose (*Alces machilis*) from North America, two Mute Swans (*Cygnus olor*), European, a Common Viper (*Vipera berus*), British, purchased; six Long-fronted Gerbilles (*Gerbillus longifrons*), born in the Gardens.

#### GEOGRAPHICAL NOTES

WE much regret to learn of the death, at Loanda, on March 17, of Dr. Paul Pogge, the successful African explorer. Dr. Pogge, since 1880, was the companion of Lieut. Wissmann in the exploration of the region inland from the Portuguese possessions,

and around the kingdom of Muatà Janvo. He accompanied Wissmann as far as Nyangwé in the journey of the latter across Africa, and in May 1882 set out to return to the station at Mukenge. Doubtless the hardships to which he has been subject, combined with fever, have told on Dr. Pogge's health. In 1874 he was a member of the German African Expedition which was sent out to explore the same region, and with only native companions succeeded in penetrating as far as the capital of Muatà Janvo.

THE announcement that Mr. Stanley intends to proceed from the Middle Congo north-east to the Mombutu country, partly, no doubt, to settle the question of the course of the Aruwimi, the great north-east tributary of the Congo, renders Dr. Junker's discoveries in the Wellé region of special interest. In the map sent home and published in the new number of *Petermann's Mittheilungen* we find in the northern part the Wellé, after receiving the Gádä, proceeding west-north-west, and on the north it is joined by the Mbrúôle, and not much further westwards by the Gúrba—both considerable rivers rising in the southern A'-Sandeh kingdom. After taking up the waters of the Gúrba, the Wellé curves sharply round, at first southwards, making many windings in its course, and describing a large semicircle round the land of A-Madi, a semicircle variegated by a series of islands. Later on it resumes its west and west-north-west direction. With the exception of the two larger tributaries from the north just mentioned, the Wellé along the whole extent of the sketch receives no considerable waters either from north or south. As far as the southern territory is concerned, this fact is explained by the circumstance that the most important tributary of the Wellé-Makua, the Bomokándi or Májo (Nemajo of Schweinfurth) flows in an extremely long course from east to west and north-west, approximately parallel to the Wellé Hut, an interval of hardly two days' journey. Further to the west, however, it discharges into the Wellé River. The Bomokándi, showing almost half the breadth of the Wellé, rises far in the east, and may also have its source in the mountainous country bordering the Albert Nyanza in the west. In consequence of this approach to each other of the two streams, no other tributaries are developed in the long tongue-shaped peninsula formed by the junction of the Wellé and Bomokándi. Except innumerable little rivulets, few rivers of any size run either northwards to the Wellé or southwards to the Bomokándi from the plateau of this peninsula. It is otherwise, however, with the rivers discharging into the Bomokándi from the south. The watershed whence flow its southern tributaries lying considerably further to the south, there is ample scope here for the formation of larger accessory streams. Proceeding from west to east, we come upon three rivers of almost equal rank with the Mbrúôle and the Gúrba—the Makongo, Pokko, and Telli. A river no longer paying tribute to the Bomokándi, but discharging further to the west directly into the Wellé, is, according to information, the Mbe'lima, the source of which is not far from that of the Makongo to the east. With these partly indirect tributaries to the Wellé through the medium of the Bomokándi and the direct tributary, the Mbe'lima, the river-system of the Wellé to the south comes to an end. Further south, and flowing from east to west, is the Náwa, belonging, according to information received, to a more southern river-system, forming indeed a northern tributary to the Népo. Dr. Junker made his way south to the Népo, four days' journey from the Bomokándi, and reached it in the middle of its course, where it holds the same longitude with the Bomokándi. He evidently travelled a long way from the region in which lie the sources of the Népo, the Bomokándi, and the Kibuli, that is, the Kibbi (Wellé)—rivers which collectively descend from the mountain and table-lands west of Albert Nyanza; the water-parting must be sought in a line running approximately from south-south-west to north-north-east. That the Népo, from the point at which he met it, and where probably it describes a northern curve, bends in its further course in an approximately south-west direction, may be inferred from the fact that though indeed known in the western territories, it is yet transferred far to the south beyond the Náwa, which rises in the west, not far from his line of route to the Népo. In the region between Bomokándi and Népo traversed by Dr. Junker, the watershed of the two river-systems is hardly perceptible, yet the country of the Népo tributaries from the north is highly characteristic. Instead of the high trees which everywhere else clothe the banks of the streams, you here meet broad, flat, treeless swamps. A floating vegetation, very like the Ssett in the Nile, forms a bridge by which to cross these swamps,

though it is unavailable for riding and for beasts of burden. Dr. Junker closes his remarks on the hydrography of this region with the observation that he feels entitled to identify this Népoko, which does not belong to the Wellé system, with the Aruwini of Stanley. Proof that the Wellé is the upper course of the Shari he hopes to be able to adduce later on.

In *Petermann's Mittheilungen*, 1884, Heft iii., is a map of the Amambara Creek of the lower Niger region, which we owe to the indefatigable African explorer Eduard Robert Flegel. Just as by way of preparation for his Adamawa expedition he executed maps of the route from Eggan to the Akoko Mountains, and of the Niger tract, till then unknown, from Bussa up the river as far as Gomba, and finally explored the route from Bidda by way of Kefi Abd-es-Senga to Loko on the Benué; so now as preparatory to his third African exploration he has executed a map of the Amambara which discharges into the lower course of the Niger. While Flegel was waiting at Lagos for a remittance from Germany to enable him to prosecute his travels, the representative of the Marseilles "Compagnie du Sénégal et de la Côte occidentale d'Afrique," J. Zweifel, the well-known discoverer of the sources of the Niger, undertook in July 1883, for trading purposes, an expedition up the Amambara, on the banks of which are planted a series of old commercial establishments, but which, nevertheless, had never yet been mapped out. To this expedition Flegel at once gladly joined himself, and hence the map in question. This must be reckoned as another valuable contribution towards clearing up the geography of the Lower Niger, so complicated by tributaries, arms, deltas, creeks, &c. In an article in the *Mittheilungen* commenting on the map of the Amambara Creek, an interesting sketch is given of the progress of geographical knowledge of the Niger for the last 300 years, or rather of the misconception and vacancy that prevailed up till quite recently regarding that region, our knowledge of which is still so very defective. Since the discovery of the rich produce in palm-oil yielded by the banks of the Niger and Lower Benué, trade has rapidly developed there, and is now so lively that Flegel, in 1883, counted as many as twenty-three large ships, mostly steamers, constantly plying on their waters, besides a series of flat barges.

WE find in the last issue of the Caucasian *Izvestia* the following new information on the Merv oasis, due to M. Alikhanoff:—Its surface is about 2150 square miles, which area could be increased by irrigation, the whole of the oasis having its origin due to the irrigation of the sands by canals drawn from the Murgab. This river, being dug at Kaushut-khan-bend, two canals, subdivided into numerous *aryks* (smaller canals), issue from it, taking in nearly all the water of the river which does not flow beneath the dam: Notwithstanding the southern position of the oasis, it has a cold winter, and there falls every year some snow, sometimes two feet deep; it soon disappears, however, as the temperature rises rapidly, and reaches occasionally 30° Celsius in February. During the summer, strong hot winds, which bring masses of hot sand, blow, mostly from the south-west. Still the climate is healthy enough, and healthier than that of Akhal-tekke; but the mortality is very great, owing to the poverty of the inhabitants and the dirtiness of their habits: the *kara-masta*, or black disease, a kind of pestilence, and the *merghi*, a kind of cholera, are endemic. The population is estimated at 32,700 *kibitkas*, which M. Alikhanoff considers to represent no less than 194,000 or 200,000 inhabitants. This population is, however, too numerous for the oasis, the average area of irrigated land being only six acres per inhabitant. M. Alikhanoff considers the Merv as the least attractive of the Turcomans, and discovers in them only one good feature—their hospitality.

AT the annual meeting of the Bremen Geographical Society it was stated that a young German naturalist intends to start on an exploring expedition to Ovambo-land and further into the interior of Equatorial Africa, accompanied by Dr. Hoepfner. A member of the Society has presented him with good astronomical instruments, and the traveller will report to the Society from time to time, and his cartographic results will belong to the Society. The Society is also preparing a geographical and natural history expedition to the Bonin Islands, lying south of and belonging to Japan. Dr. Gottsche of Kiel, an eminent geologist, who is now in Japan, will be the leader of this expedition.

THE Russian Imperial Geographical Society has received the following telegram from Col. Prijevsky, who is for the fourth time attempting to penetrate into Thibet:—"Alashan, January 8.—

We have traversed the desert of Gobi without mishap. In the northern part the cold exceeded the freezing point of mercury. We are all well, and start to-morrow for Koukou-nor. It is said that hitherto the Thibetans pray heaven to shower down stones on our heads."

THE Melbourne *Age* has despatched to New Guinea a second exploring party, the members of which include a naturalist and an artist.

ONE result of Mr. Colquhoun's recent journeys in Indo-China has been the appointment of an English official to reside at Cheng-mai, or Zimmé, on the borders of the Shan States, and an officer of our consular service in Siam has been selected for that purpose, and is now at the post. This town, it may be recollected, forms the centre of the railway communication which Mr. Colquhoun proposes between British Burmah and South-Western China, and it can be reached either from Rangoon or from Bangkok. Mr. Bock travelled from the latter town up the Meinam. With the example of the exploration of the English consuls who have resided at Chung-king on the Yangtze before him, it is to be hoped that the consul at Zimme will be able to add largely to our knowledge of the regions, especially of the Shan States, lying between China and Siam. His appointment is certainly another step in the prolonged efforts to obtain a trade route into South-Western China, and he will serve, on the south of the frontier line, the same purpose as the officer at Chung-king on the north.

### VOLCANIC ASHES AND COSMIC DUST<sup>1</sup>

IN the session of 1876, Mr. John Murray communicated to this Society a paper on the distribution of volcanic debris over the floor of the ocean,<sup>2</sup> and in it announced the discovery of cosmic dust in deep-sea deposits. It was shown that at points where neither the action of waves, rivers, or currents can transport the debris of continents, volcanic materials play the most important rôle in the formation of the mineral constituents of the deep-sea deposits. It was pointed out that pumice, on account of its structure, was able to float to great distances, but in time became waterlogged and sank to the bottom, there to decompose. On the other hand, incoherent volcanic matters, ejected in the form of lapilli, sand, and ashes, into the higher regions of the atmosphere, may, *ceteris paribus*, be conveyed, in consequence of their small dimensions and structure, to greater distances than other mineral particles derived from the continents. The possibility was also admitted that submarine volcanic eruptions might also contribute to the accumulation of those silicates and pyrogenous minerals and rocks whose microscopic characters and distribution at the bottom of the sea we shall presently point out.

During the past few years we have added greatly to the observations which were the subject of Mr. Murray's communication. The present paper has been suggested by the striking analogy which exists between the volcanic products we have found in all deep-sea sediments, and the ashes and incoherent products of a recent celebrated eruption,—that of Krakatoa. The remarkable meteorological phenomena we have recently witnessed have been attributed by some to the presence in the atmosphere of mineral particles derived from this volcanic eruption, and by others to that of cosmic dust. It is said that in several places in America, and even in Europe, matters have been collected which must be regarded as the ashes from Krakatoa, which have been suspended for several months in the upper currents of the atmosphere. The importance of this matter has been recognised by the Royal Society of London, which has appointed a committee of its members to collect all the documents and observations relative to the distribution of these ashes. The present state of the question induces us to make known some results of the detailed researches which we have undertaken upon similar subjects. We desire to make known, to those who wish to study atmospheric dust, the distinctive microscopic characters by the aid of which we have been able to establish the volcanic or cosmic nature of certain particles found in deep-sea deposits, and to show at the same time the enormous area of the ocean over which we have been able to detect their distribution.

We believe that no better example could be found in support

<sup>1</sup> "On the Microscopic Characters of Volcanic Ashes and Cosmic Dust, and their Distribution in the Deep-sea Deposits." A paper read before the Royal Society of Edinburgh by Mr. John Murray and M. A. Renard.

<sup>2</sup> *Proc. Roy. Soc. Edin.*, 1876-77.